



USNRC-DS

Westinghouse
Electric Corporation

Power Systems

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October 16, 1987
NS-NRC-87-3276

Mr. James M. Taylor, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Potential 10CFR Part 21: W-2 Cell Switch Failure

Dear Mr. Taylor:

This letter confirms the telephone conversation between Carl Berlinger and Jaime Guillen of the Nuclear Regulatory Commission and Brian McIntyre and Pete Morris of Westinghouse on 10-16-87, which informed the NRC of the potential for a substantial safety hazard as defined in 10CFR Part 21. Westinghouse has identified a possible failure mechanism of type W-2 cell switches in certain applications which might remain undetected without adequate surveillance or testing.

Background

On May 15, 1987, while the New York Power Authority Indian Point 3 plant was at cold shutdown for a scheduled refueling outage, when emergency diesel generator (DG) 31 was prevented from re-energizing 480 volt Bus 2A, due to the failure of the W-2 cell switch associated with Bus 2A's normal supply breaker, which provides an interlock to permit the DG output breaker to close. Subsequent investigation identified deformation of the spring retainer in the spring-return mechanism of the normal supply breaker's cell switch as the root cause. The spring retainer is continuously under tension whenever the breaker is "connected" (always, except for breaker testing or maintenance). Its deformation allowed a loss of spring tension that rendered the cell switch unable to spring-return to the "removed" position when normal supply breaker 52/2A was racked-out for maintenance. Thus, the DG logic system received erroneous indication preventing generation of the "open" permissive that would have allowed DG 31's output breaker to close automatically in response to the loss of power.

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Indian Point's further investigation revealed that 35 of 37 similar W-2 cell switch spring retainers in their 480 volt system breakers (shipped in 1971-1972, all in service approaching 15 years) exhibited some sign of deformation. An evaluation by Indian Point personnel led to the development of the scenario(s) Indian Point reported in their LER of September 3, 1987, under 10CFR50.73(a)(2)(v).

The Westinghouse evaluation of the W-2 cell switch failure resulted in the determination that the failure was aging-related, that the failure mechanism is related to the continuous tension experienced in the cell switch application, and that imminent failure of multiple cell switches is not anticipated. The failure does not appear, nor affect safety functions, when the breaker is "connected" (i.e. breaker racked-in - main contacts may or may not be tripped). If the failure occurs, the switch will indicate that the breaker remains in the "connected" position when the breaker has been moved to another position (i.e. "test position", "disconnected", or "removed"). Inspection or testing performed when the breaker is moved from the "connected" position would determine if a failure has occurred. Where inspection and/or testing are lacking, the potential exists that in the event the breaker is not in the "connected" position, a cell switch malfunction may prevent the completion of safety related functions dependent on cell switch indication of breaker position. If it cannot be determined that adequate inspection/testing has been implemented, it would therefore be expected that a cell switch failure may not be detected.

The type W-2 cell switches are available as optional equipment for all Westinghouse DS switchgear cabinets. Westinghouse cannot evaluate the effects of this possible undetectable failure in all potential applications since the majority of Class 1E supplied switchgear arrangements are in circuits for which Westinghouse does not have design responsibility. Each utility should determine that adequate inspection and/or testing is currently in effect for their W-2 cell switch applications.

Recommendations

The limited information available to Westinghouse for the W-2 cell switch at this time and the nature of the failure observed indicate that this failure mechanism evidences itself after several years of service. Any cell switch that has been in safety-related service more than ten years where the spring is normally under tension should be examined as described below:


Westinghouse recommends that proper cell switch operation be verified via periodic inspections or testing, or whenever the breaker is moved from its "connected" position. Proper operation of the spring retainer is only verifiable when the breaker is moved from its "connected" position. Visible inspection may be used to verify cell switch operation. It will be necessary to move the breaker out on the rails to observe that the

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switch operating lever is in its proper position (30° off vertical for the W-2 cell switch). Any uncertainty in this observation may be confirmed by manually ensuring that the switch has returned to the proper position (CAUTION: Be careful not to contact any energized terminals).

If you should have any questions, please contact myself or Mr. P. J. Morris of my staff (412)-374-5761.

Sincerely,


you W. J. Johnson, Manager
Nuclear Safety Department

Enclosure

BJM/jag:3514n